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## A revision of *Geonoma* (Arecaceae)

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## Table of contents

Abstract .....	3
Introduction .....	3
Materials and Methods .....	4
Phylogeny .....	9
Distribution .....	14
Intraspecific Variation .....	15
Morphology .....	23
Taxonomic Treatment .....	29
Acknowledgements .....	162
References .....	163
Appendix I. Qualitative Variables—Characters and Traits .....	168
Appendix II. Quantitative Variables .....	171
Appendix III. Excluded Names .....	172
Appendix IV. Plates of Type Images .....	177
Appendix V. Numerical List of Taxa and Specimens Examined .....	249

## Abstract

A taxonomic revision and phylogeny of the neotropical palm genus *Geonoma* based on morphological data and morphometric methods was carried out. 4990 herbarium specimens were scored for 44 qualitative variables and 27 quantitative variables. Qualitative variables were divided into 30 characters and 14 traits. Using the phylogenetic species concept, characters were used to recognize 68 species. These are widely distributed from southern Mexico to Bolivia and Paraguay, and reach the Lesser Antilles and Hispaniola. Analysis of each species for traits, geographic distribution, and quantitative variables led to recognition of 90 subspecies in 18 species, giving a total of 140 taxa. Twelve new species (*G. bernalii*, *G. concinnoidea*, *G. deneversii*, *G. dindoensis*, *G. fosteri*, *G. galeanoae*, *G. gentryi*, *G. operculata*, *G. peruviana*, *G. sanmartinensis*, *G. schizocarpa*, *G. venosa*) and 33 new subspecies (*G. brongniartii* subsp. *pascoensis*, *G. concinna* subsp. *simplex*, *G. concinnoidea* subsp. *coclensis*, *G. concinnoidea* subsp. *jefensis*, *G. congesta* subsp. *osensis*, *G. cuneata* subsp. *guanacastensis*, *G. cuneata* subsp. *indivisa*, *G. cuneata* subsp. *minor*, *G. cuneata* subsp. *rubra*, *G. deversa* subsp. *belizensis*, *G. deversa* subsp. *peninsularis*, *G. deversa* subsp. *quadriflora*, *G. ferruginea* subsp. *nicaraguensis*, *G. lehmannii* subsp. *corrugata*, *G. longivaginata* subsp. *copensis*, *G. longivaginata* subsp. *sanblasensis*, *G. longivaginata* subsp. *vallensis*, *G. maxima* subsp. *dispersa*, *G. maxima* subsp. *multiramosa*, *G. maxima* subsp. *sigmoidea*, *G. pohliana* subsp. *linharensis*, *G. pohliana* subsp. *rodriguesii*, *G. pohliana* subsp. *unaensis*, *G. stricta* subsp. *antioquiensis*, *G. stricta* subsp. *bracteata*, *G. stricta* subsp. *divaricata*, *G. stricta* subsp. *pendula*, *G. stricta* subsp. *pliniana*, *G. stricta* subsp. *quibdoensis*, *G. stricta* subsp. *submontana*, *G. undata* subsp. *tacarcunensis*, *G. undata* subsp. *tumucensis*, *G. undata* subsp. *venezuelana*) are described. Forty-one new combinations are made. Several of the most variable species are considered to be species complexes and are divided into morphotypes—groups of similar specimens with no formal taxonomic status. Nomenclature, descriptions and distribution maps are provided for each species and subspecies. Images of the type specimens of all new taxa are also provided. A phylogenetic analysis, using the same 30 characters used for the taxonomic revision was carried out using parsimony analysis. A sample tree and consensus tree are shown and a discussion is given of the various clades.

**Key words:** Palmae, palms, phylogeny, morphometrics, Neotropics

## Introduction

*Geonoma* Willdenow (1805: 174) is one of the largest three palm genera in the Neotropics, approximately equal in size to *Bactris* Jacquin ex Scopoli (1777: 70) and *Chamaedorea* Willdenow (1806: 638). Species of *Geonoma* are common in lowland and montane tropical moist forests in Central and South America, and reach Hispaniola and the Lesser Antilles. They occur from sea level to just over 3000 m elevation. *Geonoma* are usually rather small, understory palms, although some reach the canopy of montane forests.